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A PLANAR-SHAPED DEODORIZING MATERIAL AND ITS MANUFACTURING METHOD

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Abstract

Objective

To provide a planar-shaped deodorizing material having a high deodorizing effect with respect to malodors in a wide range and being capable of recovering the decreased deodorizing performance by a simple method, and its manufacturing method.

Constitution

A planar-shaped deodorizing material characterized by the fact that a mixed powder of a carbonized bamboo powder and an activated carbon powder is held on top of a sheet-shaped material or between at least two sheets of the material, and said carbonized bamboo powder has a weight ratio of 0.2-0.5 with respect to the mixed powder; and a method for the manufacture of the planar-shaped deodorizing material characterized by the fact that a mixed powder obtained by the addition of a hot-melt agent powder into the mixed powder mentioned previously is distributed on top of the sheet-shaped material, a sheet-shaped material is placed over this, and hot pressing is carried out.

Effects

The planar-shaped deodorizing material according to the present invention can effectively remove four major malodors of ammonia, hydrogen sulfide, trimethylamine and methyl mercaptan represented by the odors of urine, rotten eggs, decayed fish and decayed vegetables, as well as tobacco odor, and is capable of easily recovering the deodorizing performance by a simple means like sun drying or the like. In addition, it can be processed easily by cutting, sewing, etc. Processing characteristics are also excellent.

Claims

1. A planar-shaped deodorizing material characterized by a mixture of carbonized bamboo powder and activated carbon powder being held on top of a sheet material or between at least 2 sheets of material, and the weight ratio of said carbonized bamboo powder in the mixed powder being 0.2-0.5.

2. A planar-shaped deodorizing material, characterized by a mixture of carbonized bamboo powder, activated carbon powder, and hot-melt agent powder being held between at least 2 sheets of material, the weight ratio of said carbonized bamboo powder of the total amount of the carbonized bamboo powder and the activated carbon powder being 0.2-0.5, and the sheets of material that are adjacent to each other being integrated by the fusion hot-melt agent.

3. The planar-shaped deodorizing material, characterized by at least one of the sheets of material described in Claim 1 or 2 being a gas-permeable sheet.

4. A manufacturing method for a planar-shaped deodorizing material, characterized by mixing together carbonized bamboo powder, activated carbon powder, and hot-melt agent powder so that the weight ratio of the carbonized bamboo powder in the total amount of the carbonized bamboo powder and the activated carbon powder is 0.2-0.5, distributing the obtained mixed powder over a sheet material, and overlapping a sheet material on top of this and then thermally compressing them together.

Detailed explanation of the invention

[0001]

Industrial application field

The present invention relates to a planar-shaped deodorizing material that has a deodorizing effect with respect to four major malodors as well as tobacco odor and so on in a wide range of malodors, and is capable of recovering the decreased deodorizing performance by a simple means like sun drying or the like.

[0002]

Prior art

In recent years, with an upgrade in the standard of living of ordinary consumers, concern with respect to malodors of their residence, clothes, necessities and so on has increased. A wide range of malodors such as, of course, the four major malodors of ammonia, hydrogen sulfide, trimethylamine and methyl mercaptan represented by the odors of urine, rotten eggs, decayed fish and decayed vegetables, as well as tobacco odor, burned meat odor and other malodors which adhere to clothes and hair have drawn attention.

[0003]

If conventional deodorizing sheets are classified according to deodorizing mechanisms, they can be classified into four types: (1) the sensual deodorizing mechanism, (2) the chemical deodorizing mechanism, (3) the physical adsorption deodorizing mechanism, and (4) the physicochemical deodorizing mechanism. The deodorizing sheets are those processed by the utilization of any of these deodorizing mechanisms. These are explained in that there are deodorizing sheets of a. the fragrant system, b. the masking system and other deodorizing sheets in the deodorizing sheets utilizing the sensual deodorizing mechanism (1). With any of these, the malodor is made difficult to sense by using fragrances like citral, benzyl acetate, terpine oil, etc. With the deodorizing sheets utilizing this mechanism, the odor itself is not eliminated and a certain odor including the fragrance remains. As a result, their applications are limited.

[0004]

Next, for the chemical deodorizing mechanism (2), a. the oxidation-reduction method, b. the addition condensation method and other deodorizing mechanisms are available. In the deodorizing sheets utilizing this mechanism, an acrylic acid type compound, a phenol type compound, manganese sulfate, an L-ascorbic acid type compound, an imine type compound and so on are used. Malodors are eliminated by chemical reactions of these substances with malodorous substances for conversion into odorless substances, or by combination of malodorous substances in these substances. The deodorizing sheets due to this mechanism are those utilizing chemical reactions. For example, an acidic deodorizing agent is effective for an alkaline malodor. Since the odors that can be deodorized are limited, depending on the deodorizing agent used, it is virtually impossible to deodorize the odor like a tobacco odor that is a mixture of thousands of chemical substances. Furthermore, in order to eliminate the odor formed by multiple malodorous substances, the use of two or more mixed deodorizing agents can be considered. However, in this case, the deodorizing agents may react with each other. The probability is extremely high in the occurrence of problems, in which (i) the expected deodorizing mechanism is damaged and (ii) processing to a stable deodorizing material is impossible. Moreover, with deodorizing sheets using this mechanism, when the deodorizing performance is decreased and is to be reactivated, the separation of malodorous substances from the deodorizing agents, complicated methods utilizing other reaction mechanisms and so on are required. Therefore, after these deodorizing sheets are made into products and used by ordinary families, the reactivation of the deodorizing function is virtually impossible in practice.

[0005]

Furthermore, in deodorizing sheets using the physical adsorption deodorizing mechanism (3), activated carbon, carbonized bamboo, zeolite and other porous materials are used. The physical adsorption function that the surface of this porous material has is utilized. Those using this mechanism, in comparison to those using the chemical deodorizing mechanism, exhibit effectiveness with respect to odors in a wide range. In addition, the adsorbed substances can be desorbed by a simple method like exposure to the direct sunlight, and the deodorizing function can also be reactivated. Nevertheless, even with the deodorizing sheets utilizing this mechanism, for example, activated carbon can hardly remove the ammonia odor, carbonized bamboo has a strong original odor of bamboo and can hardly remove methyl mercaptan or other decayed vegetable odors, etc. There is a problem in which the odors that can be deodorized are limited. A deodorizing material capable of simultaneously and effectively removing the four major malodors (ammonia, hydrogen sulfide, trimethylamine and methyl mercaptan) in the organic odors and tobacco odor mentioned previously has not been proposed.

[0006]

Furthermore, deodorizing sheets using the physicochemical deodorizing mechanism (4) use a material obtained by the addition of an acid, an alkali or other chemical substances into activated carbon or other porous materials. Both the physical adsorption deodorizing mechanism and the chemical deodorizing mechanism are utilized. However, those using this mechanism cannot solve the previously mentioned problems of the respective deodorizing sheets using the physical adsorption deodorizing mechanism and the chemical deodorizing mechanism.

[0007]

Thus, as shown above, it is difficult to propose and discover a deodorizing [method] using a deodorizing mechanism that can remove four the major malodors of ammonia, hydrogen sulfide, trimethylamine and methyl mercaptan represented by urine, rotten eggs, decayed fish and decayed vegetables, as well as tobacco odor, and that is capable of easily recovering the decreased deodorizing performance by a simple method.

[0008]

Problems to be solved by the invention

In other words, the task of the present invention is to provide a planar-shaped deodorizing material having a high deodorizing effect with respect to malodors in a wide range like the four major malodors of ammonia, hydrogen sulfide, trimethylamine and methyl mercaptan represented by the odors of urine, rotten eggs, decayed fish and decayed vegetables, as well as tobacco odor, and being capable of recovering the decreased deodorizing performance by a simple method, and its manufacturing method.

[0009]

Means to solve the problems

As a result of the accumulation of zealous investigations using extremely numerous types of, in particular, physical adsorption deodorizing agents focusing on the physical adsorption deodorizing mechanism among the deodorizing mechanisms mentioned previously, the present inventors have discovered the deodorizing materials that can achieve the objective of the present invention. Thus, the present invention has been accomplished. In other words, the present invention is a planar-shaped deodorizing material characterized by the fact that a mixed powder of a carbonized bamboo powder and an activated carbon powder is held on top of a sheet-shaped material or between at least two sheets of the material, and said carbonized bamboo powder has a weight ratio of 0.2-0.5 with respect to the mixed powder; and a planar-shaped deodorizing

material characterized by the fact that a mixed powder of a carbonized bamboo powder, an activated carbon powder and a hot-melt agent powder is held between at least two sheets of the material, said carbonized bamboo powder has a weight ratio of 0.2-0.5 with respect to the total amount of the carbonized bamboo powder and the activated carbon powder, and adjacent sheet-shaped materials are made into a single body via the fusion hot-melt agent.

[0010]

Furthermore, the present invention is a planar-shaped deodorizing material characterized by the fact that at least one sheet of the sheet-shaped material mentioned previously is a gas-permeable sheet. Moreover, the present invention is a method for the manufacture of the planar-shaped deodorizing material characterized by the fact that a carbonized bamboo powder, an activated carbon powder and a hot-melt agent powder are mixed so that the carbonized bamboo powder has a weight ratio of 0.2-0.5 with respect to the total amount of the carbonized bamboo powder and the activated carbon powder, the a mixed powder obtained is distributed on top of the sheet-shaped material, a sheet-shaped material is placed on this, and hot pressing is carried out.

[0011]

The present invention will be explained in detail in the following. The sheet-shaped materials in the present invention are the sheet-shaped materials given in the following. Any of the following materials can be used.

(1) Resin film type sheets represented by polyethylene, polypropylene, polyethylene terephthalate, etc.

(2) Paper, knitted materials, woven cloth, nonwoven fabrics, and other fibrous sheet-shaped materials, as well as composite sheet-shaped materials constituted by such fibrous sheet-shaped materials and resin type films or resin type sheets. In regard to the fiber base materials that can be used, natural fibers represented by cotton, wool, hemp, and pulp, semisynthetic fibers like rayon, synthetic fibers represented by polyethylene, polypropylene, nylon, polyethylene terephthalate and polyvinyl alcohol, and fibers of any other base materials can also be used. The fiber base materials are not to be restricted. Furthermore, in regard to the nonwoven fabrics as the sheet-shaped materials that can be used especially preferably, nonwoven fabrics prepared by any of the spun bonding method, spun lace method, card needlepunch method, resin adhesion method, flash spinning method, melt blowing method and so on are acceptable. The present invention does not restrict its manufacturing methods.

[0012]

Furthermore, the gas-permeable sheet-shaped materials mentioned in the present invention refer to the sheet-shaped materials given in the following. Any of the following materials can be used.

(1) Porous sheets of resin type films represented by polyethylene, polypropylene, polyethylene terephthalate, etc.

(2) Paper, knitted materials, woven cloth, nonwoven fabrics, and other fibrous sheet-shaped materials, as well as composite sheets of such fibrous sheet-shaped materials and resin type films or resin type sheets. In regard to the fiber base materials that can be used in the gas-permeable sheet-shaped materials in the present invention, natural fibers represented by cotton, wool, hemp, and pulp, semisynthetic fibers such as rayon or the like, synthetic fibers represented by polyethylene, polypropylene, nylon, polyethylene terephthalate and polyvinyl alcohol, and any other fiber base materials can also be used. The present invention does not restrict fiber base materials. Furthermore, in regard to the nonwoven fabrics as the gas-permeable sheets that can be used especially preferably in the present invention, nonwoven fabrics prepared by any of the spun bonding method, spun lace method, card needlepunch method, resin adhesion method, flash spinning method, melt blowing method and so on are acceptable.

[0013]

It is acceptable that the powder activated carbon that can be used in the present invention is the ordinarily used porous material powder that can be obtained by firing coconut shell, tar, resins and so on as raw materials. A material with particle diameters of 20-100 mesh can be used preferably. If the particle diameters of the powder activated carbon are larger than 20 mesh, it will be difficult to maintain reliably the deodorizing function of the deodorizing material obtained by using this to an extent to achieve the objective of the present invention. Furthermore, if the particle diameters are smaller than 100 mesh, the activated carbon will fly easily in air and the possibility of being difficult to process to a deodorizing material will increase.

[0014]

In the present invention, the especially preferred particle diameters of the powder activated carbon are 30-70 mesh. The carbonized bamboo powder that can be used in the present invention is a bamboo powder obtained by cutting and pulverization of bamboo, extracting the bamboo sap and other extracts, followed by carbonization and further drying. For example, a publicly known material as disclosed in Japanese Kokai Patent Application No. Sho 63[1988]-109864 is acceptable. However, a material having the unique odor of bamboo is especially preferred. Such a carbonized bamboo powder can effectively remove ammonia,

trimethylamine and other malodors. Nevertheless, since the odor which the bamboo powder has is dispersed at the same time, concern for sensing the unpleasant odor is rather strong. As a result of zealous investigations, the present inventors have discovered surprisingly that a powder obtained by mixing this carbonized bamboo powder with an activated carbon powder at a weight ratio of 0.2-0.5 with respect to the total amount of the carbonized bamboo powder and the activated carbon powder can inhibit the previously mentioned dispersing of the bamboo odor of the carbonized bamboo powder and, furthermore, the previously mentioned four major malodors and tobacco odor can be effectively removed. If the previously mentioned mixing ratio of the carbonized bamboo powder is lower than 0.2, the deodorizing effectiveness with respect to ammonia as the urine odor and trimethylamine as the decayed fish odor will be low. Furthermore, if it exceeds 0.5, the odor of carbonized bamboo is strong and an unpleasant odor is dispersed.

[0015]

In the present invention, from the aspect of the deodorizing performance and the viewpoint of bending ease and other handling characteristics or processing characteristics of the deodorizing sheet-shaped material, it is preferable that the mixed powder of said carbonized bamboo powder and activated carbon powder be rendered at 10-150 g/m^2 with respect to the sheet-shaped material. If it is less than 10 g/m^2, a sufficient deodorizing performance will be difficult to obtain. Furthermore, if it is more than 150 g/m^2, the deodorizing performance will be high but softness is decreased or sewing or other processing characteristics are damaged in an undesirable manner. 15-70 g/m^2 is especially preferable.

[0016]

In the present invention, the previously mentioned carbonized bamboo powder and activated carbon powder can be held in a sheet-shaped material to an extent that they do not detach from the sheet-shaped material. For example, they can be held by adhesion, coating or other rendering means using an emulsion type adhesive, a solvent type adhesive, a hot-melt type adhesive or other commonly used adhesives. In the present invention, it is also acceptable that a mixed powder of a carbonized bamboo powder and an activated carbon powder is held by being sandwiched between two sheets of a sheet-shaped material with at least one sheet being a gas-permeable sheet that are partly joined or completely joined by using an adhesive. Furthermore, it is acceptable that, if at least one of the multiple sheet-shaped materials including the gas-permeable sheet is formed from a thermoplastic resin, a carbonized bamboo powder and an activated carbon powder are held by being sandwiched between sheets and are partly or completely subjected to thermal joining. In the present invention, such holding methods can be

used preferably. Moreover, it is especially preferable to achieve the deodorizing effect to the maximum extent if the planar-shaped deodorizing material of the present invention is obtained by allowing the presence of a carbonized bamboo powder, an activated carbon powder and a hot-melt agent powder between two sheets with at least one sheet being a gas-permeable sheet, having the carbonized bamboo powder at a weight ratio of 0.2-0.5 with respect to the total weight of this and the activated carbon powder, and making the adjacent sheet-shaped materials into a single body via a fusion hot-melt agent to form a deodorizing material.

[0017]

For the sheets of this complete thermal joining of the present invention, both sides of the adjacent, opposite sheets are adhered at certain points with a powder hot-melt agent. Since they are adhered so that most of the activated carbon powder or the carbonized bamboo powder is not covered on the surface by the hot-melt agent, there is a characteristic in which the deodorizing performance is not damaged easily. Furthermore, since each powder is adhered at certain points on the sheets, the falloff of the carbonized bamboo powder or the activated carbon powder during cutting, sewing or other processing is much less in comparison to that for the sheets subjected to partial thermal joining. Moreover, since it is adhesion at certain points, a planar-shaped deodorizing material with a soft feeling can be obtained.

[0018]

The planar-shaped deodorizing material with the presence of the hot-melt agent mentioned previously according to the present invention can be manufactured by a method in which a mixed powder of a carbonized bamboo powder, an activated carbon powder and a hot-melt agent powder is prepared by using a homomixer, a rotary type mixing machine or other commonly used powder mixing machines, this mixed powder is spread and distributed on a sheet-shaped material by using a powder shake-off apparatus used during the manufacture of, for example, adhesive sheet or the like, a sheet-shaped material is placed on this, and then thermal pressing is carried out to cause softening or fusion of the hot-melt agent for adhesion into a single body. Furthermore, if necessary, it is also acceptable that, by using more than two sheets of the sheet-shaped materials, the mixed powder mentioned previously is distributed between the sheet-shaped materials, and thermal pressing is carried out to yield a deodorizing material of a laminated structure.

[0019]

The powder hot-melt agent for use in the present invention has a melting point lower than that of the gas-permeable sheet and the sheet-shaped material used. Polyethylene type, vinyl

acetate type, nylon type, polyester type, composites of two or more of these, or other commonly used hot-melt agent powders are acceptable. The hot-melt agent in the present invention can be used preferably if it does not markedly damage the particle state during fusion.

[0020]

Application examples

Application examples of the present invention will be given in the following. All amounts and ratios are on a weight basis unless mentioned otherwise. Furthermore, all deodorizing performance tests were conducted under an atmosphere of 20±3°C and 65±10% RH. The test items evaluated in the application examples are as follows.

(1) Deodorizing performance test for four major malodors (ammonia, hydrogen sulfide, trimethylamine and methyl mercaptan)

(2) Tobacco odor deodorizing performance test

(3) Methyl mercaptan deodorizing performance reactivation test

The experimental methods are shown in detail in the following.

(1) Deodorizing performance test for four major malodors

In a conical flask with a total volume of 600 mL, various malodorous substances at specified amounts shown in Table 1 and a planar-shaped deodorizing material cut out at 5 x 10 cm were enclosed. After 1 h, malodorous substance concentrations inside the flask were measured by using Kitagawa type gas detection tubes and the remaining ratios with respect to their initial concentrations were evaluated. The initial concentrations of the malodorous substances were the values obtained by measurements of malodorous substance concentrations inside the flask after 1 min following the enclosure of specific amounts of the malodorous substances only in the 600-mL conical flask.

(2) Tobacco odor deodorizing performance test

In a conical flask with a total volume of 600 mL, a planar-shaped deodorizing material cut out into 5 x 10 cm was introduced. Next, with the placement of tobacco (Seven Star, manufactured by Nippon Tobacco Ind. Co., Ltd.) on the front tip of a syringe, 10 mL of the mainstream smoke were collected. The collected mainstream smoke was quickly enclosed into the conical flask in which the planar-shaped deodorizing material had been introduced. After 1 h, the odor inside the flask was smelled and the presence or absence of the tobacco odor was evaluated.

(3) Methyl mercaptan deodorizing performance reactivation test

In a conical flask with a total volume of 600 mL, methyl mercaptan at 20 times the specified amount shown in Table 1 and a planar-shaped deodorizing material cut out at 5 x 10 cm were enclosed. After standing for 1 h, a planar-shaped deodorizing material with the lost deodorizing performance was prepared.

[0021]

Furthermore, the planar-shaped deodorizing material subjected to the treatment described previously was sun-dried outdoors in the summer (32°C and 45% RH) for 3 h. For the planar-shaped deodorizing material subjected to the deodorizing performance reactivation treatment, the deodorizing performance test with respect to methyl mercaptan according to the four major malodor deodorizing performance test (1) was conducted. The deodorizing performance reactivation characteristics (remaining percentage) were determined.

[0022]

Application Examples 1-3

Polyethylene terephthalate was subjected to melt spinning and drawn with an air sucker from a spinning clasp to prepare a uniform long fiber web. This was thermally pressed between an embossing roll having uniformly arranged protruded portions and a lower roll having a smooth surface to obtain long fiber nonwoven fabrics with a fineness of 2d and a basis weight of 30 g/m^2.

[0023]

A coconut activated carbon powder screened to a particle size of 32-60 mesh (commercial product name Yashikoru [transliteration] S, manufactured by Taihei Chemical Co., Ltd.), a carbonized bamboo powder obtained by carbonization and drying after extraction of bamboo sap and other extracts following cutting and pulverization of bamboo (commercial product name Badeol [transliteration], manufactured by TC Trader Co., Ltd.), and an EVA type hot-melt agent powder with a melting point of 83°C and a melt index of 2.5 (commercial product name PES-400, manufactured by Japan Unicar Co., Ltd.) were mixed in the ratios shown in Table 2 with a rotary type powder mixer to obtain three types of mixed powders of the carbonized bamboo powder, the activated carbon powder and the hot-melt agent powder.

[0024]

As a result of the determination of the minimum particle diameter and the maximum particle diameter of each of the powders by using electron microscopic photography, the

activated carbon powder had 40-680 μm and the carbonized bamboo powder had 40-600 μm. Furthermore, the hot-melt agent powder had 100-500 μm, with an average particle diameter of 350 μm. Next, by using a hot-roll joining type laminate apparatus equipped with a powder spreading apparatus used commonly in laminates of paper or cloth, spreading was carried out on top of polyester long fiber nonwoven fabrics of 30 g/m^2 so that the total of the carbonized bamboo powder and the activated carbon powder was 25 g/m^2 (or a total of the carbonized bamboo powder, the activated carbon powder and the hot-melt agent powder of 45 g/m^2). Furthermore, polyester long fiber nonwoven fabrics of 30 g/m^2 were placed on top, and joining was carried out with a hot pressing roll heated to 150°C to obtain three types of the deodorizing sheets. These were Application Examples 1-3.

[0025]

As shown in Table 2, for all Application Examples 1-3, the remaining percentage of ammonia was less than 8%, and the remaining percentage for each of hydrogen sulfide, trimethylamine, and methyl mercaptan was 0%. The four major malodors were deodorized virtually completely. Furthermore, even in regard to the tobacco odor, it was all completely deodorized. Moreover, for the reactivation characteristics of the deodorizing performance, they were reactivated to a remaining percentage of 30% by sun drying for 3 h. The reactivation characteristics of a practically useful level were confirmed.

[0026]

Comparative Examples 1-4

Polyethylene terephthalate was subjected to melt spinning and drawn with an air sucker from a spinning clasp to prepare a uniform long fiber web. This was thermally pressed between an embossing roll having uniformly arranged protruded portions and a lower roll having a smooth surface to obtain long fiber nonwoven fabrics with a fineness of 2d and a basis weight of 30 g/m^2.

[0027]

A coconut-activated carbon powder screened to a particle size of 32-60 mesh (commercial product name Yashikoru S, manufactured by Taihei Chemical Co., Ltd.), a carbonized bamboo powder obtained by carbonization and drying after extraction of bamboo sap and other extracts following cutting and pulverization of bamboo (commercial product name Badeol, manufactured by TC Trader Co., Ltd.), and an EVA type hot-melt agent powder with a melting point of 83°C (commercial product name PES-400, manufactured by Japan Unicar Co., Ltd.) were mixed in the ratios shown in Table 2 with a rotary type powder mixer to obtain four

types of mixed powders of the carbonized bamboo powder, the activated carbon powder and the hot-melt agent powder.

[0028]

Next, by using these four types of mixed powders and a hot-roll joining type laminate apparatus equipped with a powder spreading apparatus used commonly in laminates of paper or cloth, spreading was conducted on top of polyester long fiber nonwoven fabrics of 30 g/m^2 so that the total of the carbonized bamboo powder and the activated carbon powder was 25 g/m^2 (or a total of the carbonized bamboo powder, the activated carbon powder and the hot-melt agent powder of 45 g/m^2). Furthermore, polyester long fiber nonwoven fabrics of 30 g/m^2 were placed on top, and joining was carried out with a hot pressing roll heated to 150°C to obtain four types of deodorizing sheets. These four types of sheets were Comparative Examples 1-4.

[0029]

For the sheet with activated carbon alone in Comparative Example 1, hydrogen sulfide, trimethylamine, methyl mercaptan and tobacco odor were virtually completely deodorized, but ammonia from urine or perspiration odor had a remaining percentage of 69%. This was virtually not deodorized. For sheets of Comparative Examples 2 and 3, the four major malodors were virtually completely deodorized. However, in addition to tobacco odor alone remaining, there was an odor of carbonized bamboo with an unpleasant scent.

[0030]

For the sheet with carbonized bamboo alone in Comparative Example 4, percentages of hydrogen sulfide and methyl mercaptan odors remaining were 57% and 70%, virtually without deodorization. Furthermore, in regard to tobacco odor, it was virtually not deodorized. Moreover, the planar-shaped deodorizing material itself had a strong odor of carbonized bamboo with an unpleasant scent.

[0031]

Table 1. Amounts of malodorous substances enclosed

(1) 悪臭物質	封入物質 (2)	(3) 濃度	(4) 封入量	(5) 初期濃度
(6) アンモニア	NH_3 (10)	0.05%水溶液	1.0 ml	120 ppm
(7) 硫化水素	Na_2S H_2SO_4	0.08%水溶液 1N水溶液 (10)	0.2 ml 1.0 ml	20 ppm
(8) トリメチルアミン	$(CH_3)_3N$	0.01%水溶液 (10)	0.3 ml	20 ppm
(9) メチルメルカプタン	CH_3SH	0.1%ベンゼン溶液 (11)	0.2 ml	100 ppm

Key: 1 Malodorous substance
2 Enclosed substance
3 Concentration
4 Amount enclosed
5 Initial concentration
6 Ammonia
7 Hydrogen sulfide
8 Trimethylamine
9 Methyl mercaptan
10 Aqueous solution
11 Benzene solution

[0032]

Table 2. Evaluation results for deodorizing materials

	(1) 粉体付与量(g/m²)			4大悪臭(残存率%) (2)				(3) タバコ消臭試験	(4) 消臭シート臭気	(5) 消臭性能の復活性(残存率%)
	乾留竹 (6)	活性炭 (7)	ホットメルト剤 (8)	アンモニア (9)	硫化水素 (10)	トリメチルアミン (11)	メチルメルカプタン (12)			
(13) 実施例1	5	20	20	8	0	0	0	臭わない	無臭	30
実施例2	10	15	20	3	0	0	0	臭わない	無臭	30
実施例3	12.5	12.5	20	0	0	0	0 (15)	臭わない	無臭 (16)	30
(14) 比較例1	0	25	20	69	0	0	0	臭わない	無臭	30
比較例2	15	10	20	0	0	0	0	僅かに臭う (17)	乾留竹の臭いが僅かにする (18)	30
比較例3	20	5	20	3	0	0	0	僅かに臭う	乾留竹の臭いがする (19)	30
比較例4	25	0	20	19	57	0	70	臭う (20)	乾留竹の臭いが非常に強い (21)	30

Key: 1 Amount of powder rendered (g/m^2)

2 4 major malodors (percentage remaining)
3 Tobacco deodorizing test
4 Deodorizing sheet odor
5 Reactivation characteristics of the deodorizing performance (percentage remaining)
6 Carbonized bamboo
7 Activated carbon
8 Hot-melt agent
9 Ammonia
10 Hydrogen sulfide
11 Trimethylamine
12 Methyl mercaptan
13 Application Example ___
14 Comparative Example ___
15 No smell detected
16 Odorless
17 Slight smell detected
18 Slight odor of carbonized bamboo
19 Odor of carbonized bamboo
20 Smell detected
21 Odor of carbonized bamboo very strong

[0033]

Effect of the invention

The planar-shaped deodorizing material according to the present invention can effectively remove the four major malodors of ammonia, hydrogen sulfide, trimethylamine and methyl mercaptan represented by the odors of urine, rotten eggs, decayed fish and decayed vegetables, as well as tobacco odor, and is capable of easily recovering the deodorizing performance by a simple means such as sun drying or the like. Furthermore, the planar-shaped deodorizing material according to the present invention can be processed easily by cutting, sewing, etc. Processing characteristics are also excellent. Utilizations are expected in a wide range of fields, for example, from shoe deodorization, refrigerator deodorization, bedding deodorization, dress covers and other deodorizations, storage bags and other daily necessities, to deodorizing sheets for fresh fish transportation, deodorizing materials for industrial wastes, and other industrial resource materials.

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